

REMARKS/ARGUMENTS

Claims 1-10 stand in the present application, claims 1, 3 and 6 having been amended. Reconsideration and favorable action is respectfully requested in this case, in view of the above amendments and the following remarks.

In the Office Action, the Examiner has rejected claims 3-5 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. As noted above, claim 3 has been amended to correct the § 112 deficiency noted by the Examiner. According, claims 3-5 in view of the above-described amendment to claim 3, are now believed to overcome the Examiner's § 112 rejections of these claims.

The Examiner has also rejected claims 1-4 and 6-9 under 35 U.S.C. § 103(a) as being unpatentable over Wolf et al. In view of the above-described claim amendments to independent claims 1 and 6, the Examiner's § 103 rejections of the claims are believed to have been overcome, as will be described in greater detail below.

More particularly, independent claims 1 and 6 have been amended to further recite that the audio and visual elements of the stimulus are analysed for the presence of characteristic features indicative of the significance of synchronisation errors and the measure of subjective quality is modified according to whether the characteristic features are present. Support for these additional features of Applicant's invention can be found in the present specification at, *inter alia*, page 3, line 26 through page 4, line 13 and page 6, line 30 through page 8, line 8. Since the cited reference is not believed to teach or suggest these features of Applicant's invention, claims 1 and 6 and their

respective dependent claims 2-5 and 7-9 are believed to patentably define over the cited reference, as will be described in greater detail below.

Wolf et al. discloses a system for extracting features from reference and degraded signals, and measuring the delay between these features to compute the synchronisation error between the audio and video. The Wolf et al. system does that by measuring delay between the video-reference and video-degraded features on one side, audio-reference and audio-degraded features on the other side. Thus, as will be explained below, the Wolf et al. system differs significantly from Applicant's invention.

In particular, Applicant's invention measures the synchronisation error between audio and video and does so by matching video cues with audio cues, and measuring the delay between them. For example, in Applicant's invention if the video is showing something bouncing on the floor and the audio contains a brief noise, the peak in the audio envelope is meant to align with a change in the video's motion vectors. Thus, while the cited reference is only comparing features within the same media, between the reference and degraded signals, for audio and then the same for video, Applicant's invention is matching events across medias, i.e., audio to video, and without using a reference signal.

This is an important distinction in Applicant's invention which allows Applicant's invention to work in a no-reference context. Thus, a key distinction between Wolf et al. and Applicant's invention is that Wolf et al. is aligning in time to curves of identical nature, while Applicant's invention is cross-model, and defines common events occurring between parameters of very different natures (i.e., in the example above, the

not in claims ???

audio envelope and the motion vectors) and uses these events to estimate an audio-visual delay.

In other words, Wolf et al. is essentially simply comparing the separate delays in the audio and video signals to determine the magnitude of the synchronisation error. The two delay values are each measured by comparing a reference signal with a received degraded (delayed) signal. To the contrary, Applicant's invention requires no reference signals, but determines synchronisation by comparing cues in the received signals themselves. Thus, one would expect an abrupt change in a motion vector, perhaps denoting an impact or collision of some kind, to coincide with an abrupt sound on the sound track. Applicant's invention, as recited in the present claims, is believed to patentably define over the cited reference on this basis alone.

Moreover, by comparing the actual timings of such visual and audible cues a measure of the delay can be determined in Applicant's invention. In the absence of such cues, lack of synchronisation is subjectively less significant. For example, in the case of a repetitive process, such as a pendulum swinging, a perceptually good match may occur if the sound track is out of synchronisation by a period equal to one or more cycles of the process – one swing of a pendulum looks and sounds much like another. Despite the large actual error in synchronisation, the present invention, as now more clearly recited in the present claims, would correctly identify the error as subjectively low, as the audible cues would be synchronized with visual cues. Thus in addition to the patentable distinction discussed above, these analyzing and modifying features of Applicant's invention, now recited in amended claims 1 and 6, are also clearly not taught or even suggested by Wolf et al. Accordingly, claims 1 and 6 and their respective

dependents claims are believed to further patentably define over Wolf et al. in view of these features added to the present claims.

The Examiner has also rejected claims 5 and 10 under 35 U.S.C. § 103(a) as being unpatentable over Wolf et al. in view of Bickmore et al. Applicants respectfully traverse the Examiner's rejection of claims 5 and 10 on this combination of references.

While the Examiner does not expressly state how Bickmore is being applied in combination with Wolf et al. to reject claims 5 and 10, it should be clear from the above discussion that Bickmore et al. does not solve the deficiencies noted above with respect to Wolf et al. For example, Bickmore et al. clearly does not teach or suggest the analyzing and modifying features that have been introduced into the present claims. Accordingly, claims 5 and 10 are believed to patentably define over the cited references, taken either singly or in combination.

Therefore, in view of the above amendments and remarks, it is respectfully requested that the application be reconsidered and that all of claims 1-10, standing in the application, be allowed and that the case be passed to issue. If there are any other issues remaining which the Examiner believes could be resolved through either a

*Bickmore
(in combination with
Wolf et al.)*


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supplemental response or an Examiner's amendment, the Examiner is respectfully requested to contact the undersigned at the local telephone exchange indicated below.

Respectfully submitted,

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